

That which is claimed is:

1. A process for separating solids from liquids in a filtration zone defining a higher concentration zone and a lower concentration zone separated by a filter, the process comprising the steps of:
  - (a) directing a slurry feed comprising a liquid and a solid into the higher concentration zone;
  - (b) directing a displacement fluid to the higher concentration zone; and
  - (c) removing at least a portion of the liquid through the filter to the lower concentration zone, producing a filtrate; wherein the displacement fluid displaces at least a portion of the liquid from the slurry feed.
- 15 2. The process of Claim 1, wherein the displacement fluid is a gas.
3. The process of Claim 1, wherein the displacement fluid flows in countercurrent relation to the flow of the slurry feed in the higher concentration zone.
- 20 4. The process of Claim 2, wherein the gas flows in countercurrent relation to the flow of the slurry feed in the higher concentration zone.
5. The process of Claim 1, further comprising the step of passing at least a portion of the displacement fluid through a filter to the lower concentration zone.

6. The process of Claim 2, further comprising the step of passing at least a portion of the gas through a filter to the lower concentration zone.

5 7. The process of Claim 1, wherein the slurry feed comprises a product from a crystallization process.

8. The process of Claim 2, wherein the slurry feed comprises a product from a crystallization process.

10 9. The process of Claim 7, wherein the slurry feed comprises para-xylene.

15 10. The process of Claim 8, wherein the slurry feed comprises para-xylene.

11. The process of Claim 1, wherein the filtrate comprises at least one of ortho-xylene, meta-xylene and para-xylene.

20 12. The process of Claim 2, wherein the filtrate comprises at least one of ortho-xylene, meta-xylene and para-xylene.

13. The process of Claim 1, further comprising the step of forming a dense phase in the higher concentration zone.

25 14. The process of Claim 2, further comprising the step of forming a

dense phase in the higher concentration zone.

15. The process of Claim 13, wherein the dense phase comprises a solid packed bed.

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16. The process of Claim 14, wherein the dense phase comprises a solid packed bed.

17. A process for maintaining a solid phase throughout the separation  
10 of liquids from solids in a filtration zone defining a higher pressure zone and a lower pressure zone separated by a filter, the process comprising the steps of:

- (a) directing a slurry feed comprising a liquid and a solid to the higher pressure zone at a pressure;
- (b) imparting an opposing pressure on the slurry feed in the higher pressure zone;
- 15 (c) forming a dense phase in the higher pressure zone; and
- (d) maintaining the higher pressure zone at a temperature lower than the melting point of at least one solid in the slurry feed.

20 18. The process of Claim 17, wherein the opposing force comprises hydraulic pressure.

19. The process of Claim 17, wherein the opposing force comprises pneumatic pressure.

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20. The process of Claim 17, wherein the temperature in step (d)

corresponds to the melting point of para-xylene.

21. The process of Claim 17, wherein the slurry feed comprises a product of a crystallization process.

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22. The process of Claim 21, wherein the slurry feed comprises para-xylene.

23. A process for separating solids from liquids in a filtration zone  
10 defined by a higher pressure zone and a lower pressure zone separated by a filter, the process comprising the steps of:

- (a) directing a slurry feed comprising a liquid and a solid into the higher pressure zone;
- (b) directing a displacement fluid into the higher pressure zone in  
15 countercurrent relation to the slurry feed;
- (c) forming a dense phase in the higher pressure zone; and
- (d) passing at least a portion of the fluid through the filter to the lower pressure zone.

20 24. The process of Claim 23, wherein a substantial portion of the displacement fluid passes through the filter to the lower pressure zone.

25 25. The process of Claim 23, wherein at least a portion of the displacement fluid passes through at least a portion of the solid packed bed to the filter.

26. The process of Claim 23, further comprising the step of passing at least a portion of the liquid through the filter to the lower pressure zone, forming a filtrate.

5 27. The process of Claim 23, wherein the displacement fluid is insoluble with the solids in the slurry feed.

28. The process of Claim 26, wherein the displacement fluid is substantially insoluble with the filtrate.

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29. The process of Claim 23, wherein the displacement fluid is a gas.

30. The process of Claim 23, wherein the higher pressure zone is maintained at a temperature lower than the melting point of at least one solid in  
15 the slurry feed.

31. The process of Claim 29, wherein the higher pressure zone is maintained at a temperature lower than the melting point of at least one solid in the slurry feed.

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32. A process for purifying para-xylene in a filtration zone defined by a higher pressure zone and a lower pressure zone separated by a filter, the process comprising the steps of:

25 (a) directing a slurry feed comprising a liquid and crystallized para-xylene at a temperature into the higher pressure zone;  
(b) directing a displacement fluid at a temperature lower than the

melting point of para-xylene into the higher pressure zone in countercurrent relation to the slurry feed;

(c) passing at least a portion of the liquid through the filter to the lower concentration zone, producing a filtrate.

5 (d) forming a dense phase comprising at least a portion of the crystallized para-xylene in the higher pressure zone; and

(e) recovering at least a portion of the crystallized para-xylene from the higher pressure zone.

10 33. The process of Claim 32, wherein the displacement fluid is a gas.

34. The process of Claim 32, wherein the dense phase comprises a solid packed bed.

15 35. The process of Claim 32, wherein the slurry feed is directed into the higher pressure zone at a temperature less than -50° F.

36. The process of Claim 32, wherein the slurry feed is directed into the higher pressure zone at a temperature less than -75° F.

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37. The process of Claim 33, wherein the recovered crystallized para-xylene is at a temperature less than -25° F.

25 38. The process of Claim 33, wherein the recovered crystallized para-xylene is at a temperature less than -50° F.

39. The process of Claim 33, wherein the recovered crystallized para-xylene is at a temperature less than -75° F.

40. A solid-liquid separation process, comprising:

5 (a) providing a filter column comprising a hollow cylinder and at least one filter tube extending in an axial direction within the hollow cylinder, wherein at least one tube comprises an integrally attached filter, the filter forming a direct connection between an interior of the tube and an interior of the hollow cylinder;

10 (b) directing a slurry feed into the hollow cylinder; and

(c) directing a displacement fluid into the hollow cylinder.

41. The process of Claim 40, wherein the displacement fluid is a gas.

15 42. The process of Claim 40, further comprising the step of passing a substantial portion of the displacement fluid through a filter.

43. The process of Claim 41, further comprising the step of passing a substantial portion of the gas through a filter.

20 44. The process of Claim 40, wherein the slurry feed comprises para-xylene.

45. The process of Claim 41, wherein the slurry feed comprises para-xylene.

46. The process of Claim 44, further comprising the step of forming a dense phase in the hollow cylinder.

47. The process of Claim 45, further comprising the step of forming a 5 dense phase in the hollow cylinder.

48. The process of Claim 46, wherein the dense phase comprises a solid packed bed.

10 49. The process of Claim 48, wherein at least a portion of the gas passes through at least a portion of the solid packed bed to the filter.

15 50. A process for separating solids from liquids in a filtration zone defining a higher pressure zone and a lower pressure zone separated by a filter, the process comprising the steps of:

(a) directing a slurry feed into the higher pressure zone at a pressure greater than atmospheric pressure;

(b) directing a displacement fluid into the higher pressure zone at a pressure sufficient to pass at least a portion of the displacement fluid through the 20 filter to the lower pressure zone; and

(c) forming a dense phase in the higher pressure zone;

wherein the pressure of the displacement fluid is lower than the pressure of the slurry feed after the formation of the solid packed bed.

25 51. The process of Claim 50, wherein the displacement fluid is a gas.

52. The process of Claim 51, wherein the dense phase comprises a solid packed bed.